

R & D CATALOG FORM

DATE
9 April 1965

1. PROJECT TITLE/CODE NAME

Image Intensifier Screen

2. SHORT PROJECT DESCRIPTION

This project is to develop a rear-projection screen which will, itself, intensify the brightness of an image projected upon it.

3. CONTRACTOR NAME

4. LOCATION OF CONTRACTOR

5. CLASS OF CONTRACTOR

Manufacturer

6. TYPE OF CONTRACT

CPFF

7. FUNDS

FY 1965

8. REQUISITION NO.

NA

9. BUDGET PROJECT NO.

NP-V-5

FY 1966

10. EFFECTIVE CONTRACT DATE
(Begin - end)

May 1965-May 1967

11. SECURITY CLASS.

A. A. - Confidential
T. - Unclassified
W. - Unclassified

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

DDI/NPIC/P&DS

Declass Review by NGA

13. REQUIREMENT/AUTHORITY

Exploitation of large volumes of reconnaissance photography requires scanning using rear-projection screens. A successful screen of this type would have wide application in all devices employing rear-projection screens.

14. TYPE OF WORK TO BE DONE

Applied research directed toward the development of a superior rear-projection viewer.

15. CATEGORIES OF EFFORT

MAJOR CATEGORY

Viewers and other
Interpretation Equipment

SUB-CATEGORIES

Visual
Interpretation/Analysis
Photo Reconnaissance

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.

This project includes the fabrication of three prototype screens (6"x6", 12"x12" and 30"x30") and three documentary reports. This screen will reduce the radiation (and attendant heat) required to be transmitted through the imagery.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION The Naval Training Devices Center is supporting a contract with [redacted] to develop an image intensifier screen; however, this screen, when developed, will not satisfy our requirements which are considerably more rigid. Other intensifier screens have been developed for DOD and industry; however, they are low resolution screens for portraying non-image type data.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required)

Rear-projection viewers have come into standard use for scanning and interpreting photographic transparencies. The majority of these materials are very high resolution and small scale and, as a consequence, they require great enlargement to enable the human visual system to perceive the total information content. This high magnification, in turn, requires considerable increase in the power of the projection lamp in order to obtain the necessary image brightness over the entire viewing screen. Increased lamp power is accompanied by greatly increased heat incident (Contd.)

19. APPROVED BY AND DATE

OFFICE

DEPUTY DIRECTOR

DDC I

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18. upon the film to the extent that the film becomes distorted or damaged. There are in existence various techniques for cooling the film at the film plane; e.g., dichroic mirrors, fans, liquid gates, etc. In spite of these techniques, stationary or slowly moving film is still subject to heat damage at high magnifications.

It has been postulated that this problem might be solved by intensifying the image at the viewing screen. Such a screen would require minimal power in the projection illumination, but would produce a bright image for the viewer.

The primary objective is that, under nominal highlight illumination of approximately 10 foot candles, the image-intensifier screen should provide the viewer with an image of adequate gain and brightness while still exhibiting satisfactory performance in many other aspects, such as, resolution, tonal range, linearity, color temperature, viewing angle, response time, size, screen life and cost.

A secondary objective is to provide a possible means for controlling modulation of image contrast, such as tone-reversal and gray scale compression or expansion.

This project is directed toward the development of an advanced image intensifier screen. It is a reflective system and incorporates a grid-controlled photo conductor (PC) layer and utilizes VARAD dipole material as an output layer in place of the more common (EL) electroluminescent material, or phosphor. VARAD is not self-luminous but is, rather, a modulator of light in that it varies its reflectance, transmittance or absorptance in response to an applied electric field. In the contemplated system, the photo transparency is projected so that it is imaged on the rear of the image intensifier screen thereby exciting the photo conductor which, in turn, selectively varies the electric field. The more light falling on an area, the greater the field strength, thereby causing the suspended particles in the VARAD cell to align with the field. Where the particles are aligned, the VARAD becomes transparent and passes light; conversely, where the particles are randomly dispersed they absorb. A reflective layer is placed between the VARAD and the photo conductor; consequently, when the screen is lighted from front, light passes through the aligned particles and is reflected; therefore, these areas appear bright while light striking the unaligned particles is absorbed and these areas, in turn, appear black or intermediate tones of grey depending upon the degree of particle alignment.

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18. The following goals are to be achieved or approached during the course of the proposed program:

- a. Light output approaching 200 foot-lamberts at 100X.
- b. Resolution of at least 10 lines/mm.
- c. Flicker free display.
- d. Dynamic tonal range of 20 grey steps.
- e. Screen size of 12" by 12" capable of expansion to 30" x 30".
- f. Signal-to-noise ratio greater than 100.
- g. Unity gamma over a range of brightness of 100:1.
- h. Positive-or negative viewing.
- i. Minimal energy transmitted through the film.
- j. Variable density compression and expansion.
- k. Long screen life expectancy.

This project will be accomplished under a 13 month program to be funded over two fiscal years at a total cost of [REDACTED] funded in fiscal 1965 and [REDACTED] in fiscal 1966. The contractor will supply a final report one month after the delivery of the 30"x30" screen.

The necessary security clearances are in effect at the contractors plant as the result of other [REDACTED] contracts.

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